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Gender inequality has been a constant struggle for women throughout history with victories few and far between. The movement for women's rights emerged with the anti-slavery movement in the mid-1800s; however, it wasn't until the late 1800s that women were allowed to grace the distinguished and revered lecture halls of higher education, and not until 1920 that women gained the right to formally matriculate and attain degrees. Upon commencement of women into the ranks of academia, the necessity to secure women's rights for higher education appeared to be satiated. However, gender discrimination continued to plague particular fields of study, specifically the sciences, hindering explosive development and inhibiting potential innovative advancements. Although great progress has been made to increase the ranks of women in academia over the last couple decades, women remain underrepresented in faculty positions within scientific fields of study. The field of Neuroscience, although primarily male dominated, has had a few significant leading women pioneers who have courageously revolutionized the parameters of the science despite the strong opposition of the gender barriers. This paper aims to expose the underlying motives that perpetuate the gender bias in the field of neuroscience and explore the progress that has been made through the exemplary career and life of world-renowned and highly-respected neuroscientist Patricia Goldman-Rakic.

The gender composition of any given labor force is directly dependent on the collection of men and women with the required skills and education required for employment. Therefore, the number of women attaining scientific degrees should be relatively proportionate to the amount of females holding faculty positions within scientific academia. However, this is not evident in reality. According to Xie and Shauman, authors of Women in Science, by 1995 the percent of female biological science baccalaureate recipients had risen to a well-represented fifty percent whereas female representation among biological scientists only rose to about thirty-three percent (1). The statistics specific to female representation in neuroscience follow a similar trend, though slightly more exaggerated. The amount of women in graduate neuroscience programs and medical schools appears rather optimistic as female graduate students have risen to the majority at fifty-five percent in these programs; however, the concerning indicator of gender

bias lies in the male to female ratio of faculty members: approximately three women for every 10 men (2). Although the reason for this gender discrepancy is multi-faceted, there is one key factor that can be defined to account for the majority of the gender bias within neuroscience.

The central aspect of the gender prejudice is implicit gender bias. Implicit gender bias is a characteristic the leads to the tendency to think of men as possess qualities that make him more hirable like intelligence and competence and to think of women as exhibiting more maternal and sensitive qualities that are often viewed as unproductive in the workplace. This phenomenon is in the field of scientific academia by two prominent studies. In 2003, a study was conducted that where science faculty were randomly assigned either a male or female name and asked to rate the application; regardless of gender, faculty participants rated male applicants as significantly more competent and hirable than the identical female applicant (3). These results were replicated in a 2007 study were researchers found that faculty who wrote letters of recommendation for students were significantly more inclined to use more stand-out and complimentary language to describe male students and more standard language to describe female students (4). In both studies, neither men nor women faculty members were immune to implicit gender bias which downplays women's competence while emphasizing their amiability and maternal instincts.

Although initially faced with the adversity of a strong gender bias, particularly during the 1960s before the explosive rise of women in science, Patricia Goldman-Rakic challenged the social norm and surpassed many of her male colleagues in innovative and substantial research. She was considered a pioneer in the subject of memory function and in 1979 after pursuing her research at UCLA, NYU, MIT, and the National Institute for Health, Goldman-Rakic officially joined the ranks of faculty in the department of neuroscience at Yale. With the backing of this substantial university and her brilliant mind, Goldman-Rakic acted as author and collaborator on hundreds of collections of published scientific research which primarily focused on integrating anatomical, developmental, and pharmacological studies of the prefrontal cortex (5).

Goldman-Rakic brought a unique multidisciplinary perspective to the study of the prefrontal lobe which enabled her to discover ground-breaking findings, which would significantly aid in both the understanding of memory function and development and key neurological disorders like schizophrenia, Alzheimer’s, Parkinson’s, and ADHD. She was the first pioneer to specifically match physiological function to precise anatomical areas of the brain. In one of her famous research publications, which topped the charts as being among the top 100

most influential papers in cognitive science (5), Goldman-Rakic introduced her extensive mapping of the overarching organization of inputs and outputs throughout the forebrain (6). Another key milestone in her research career was her findings that concluded iontophoresis of GABAergic antagonists onto prefrontal cells destroyed their special tuning and established an important connection between computational neuroscience and cognitive neuroscience, paving the way for future research (7). Also, possible more applicably substantial were her studies on dopamine receptors that have lead the way in researching potential pharmacological treatments of schizophrenia and Parkinson's disease (8).

Although quite acclaimed for her innovative research, Goldman-Rakic's greatest contribution to the progress being made to remove gender bias in the sciences may have been her inspirational involvement in the industry of neuroscience itself. She served as President of numerous associations including New York Presbyterian Hospital and the Society for Neuroscience. In addition, Goldman-Rakic received numerous awards in recognition of her tireless work ethic in innovative research and her service to the field of neuroscience including but definitely not limited to the Distinguished Scientific Contribution Award from the American Psychological Association, Fyssen Foundation Prize in Neuroscience, and the Karl Lashley Award from the American Philosophical Society (5).

Although significant progress has been made in the last few decades to promote gender diversity in the neuroscience academia, there is still a significant amount of reform that needs to occur in the field itself and within the minds of its members according to the substantial presence of implicit gender bias. Patricia Goldmann-Rakic was once scared of the prospect of success in a "Man's World" (5), but her courage is an inspiring example of the contributions women can make and the necessity of their presence in the field of neuroscience. Not only was Goldman-Rakic an innovative and relentless researcher, she was an inspiring mentor and example to young researchers. Her discoveries and perspectives of the brain and its functions have forever impacted the path of scientific study into the field of neuroscience.

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